

**WHAT IS CLAIMED IS:**

1. A power amplifier with an active bias circuit, comprising:
  - a power amplifier transistor with a gate connected to a gate bias voltage; and
  - an active bias circuit connected to an input power terminal and the gate of the power amplifier transistor for receiving an input power from the input power terminal and outputting the gate bias voltage to the gate, wherein the gate bias voltage is increased corresponding to an increase of the input power.
2. The power amplifier of claim 1, wherein a curve of an increase of the gate bias voltage versus the input power is a linear curve.
3. The power amplifier of claim 1, wherein a curve of an increase of the gate bias voltage versus the input power is a non-linear curve.
4. The power amplifier of claim 1, wherein the power amplifier transistor and the active bias circuit is manufactured by a system on chip (SOC) process.
5. The power amplifier of claim 1, wherein the active bias circuit comprises a diode and a resistor.
6. The power amplifier of claim 5, wherein an equivalent resistance of the diode in the active bias circuit varies in correspondence with the input power.
7. An integrated circuit for a power amplifier with an active bias circuit, comprising:

a power output device;

a power amplifier transistor with a gate connected to a gate bias voltage;

an active bias circuit connected to the power output device and the gate of the power amplifier transistor for receiving an input power from the power output device and providing a gate bias voltage to the gate, wherein the gate bias voltage is increased corresponding to an increase of the input power; and

a power input device connected to an output terminal of the power amplifier transistor for receiving an amplified output power from the power amplifier transistor.

8. The integrated circuit of claim 7, wherein a curve of an increase of the gate bias voltage versus the input power is a linear curve.

9. The integrated circuit of claim 7, wherein a curve of an increase of the gate bias voltage versus the input power is a non-linear curve.

10. The integrated circuit of claim 7, wherein the power amplifier transistor and the active bias circuit is manufactured by a system on chip (SOC) process.

11. The integrated circuit of claim 7, wherein the active bias circuit comprises a diode and a resistor.

12. The integrated circuit of claim 11, wherein the equivalent resistance of the diode in the active bias circuit varies in correspondence with the input power.

13. A method for generating a gate bias voltage of a power amplifier transistor

corresponding to an input power, comprising:

providing an input power; and

outputting a gate bias voltage corresponding to the input power, wherein the gate bias voltage is increased corresponding to an increase of the input power.

14. The method of claim 13, wherein a curve of an increase of the gate bias voltage versus the input power is a linear curve.

15. The method of claim 13, wherein a curve of an increase of the gate bias voltage versus the input power is a non-linear curve.